Fisheries and Oceans Canada | Pêches et Océans Canada
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Maritimes Region

Canadian Science Advisory Secretariat
Science Response 2017/032

STOCK STATUS UPDATE OF BROWNS BANK NORTH SCALLOPS (*PLACOPECTEN MAGELLANICUS*)

Context

Advice on the status of the Browns Bank North Scallop stock is requested annually by Fisheries and Oceans Canada (DFO) Resource Management to help determine a total allowable catch (TAC, meat weight) in support of the fishery. The purpose of this report is to update the status of Browns Bank North Scallop with data from the 2016 Scallop survey and fishery to provide science advice for the management of the 2017 fishery. The last peer-reviewed Regional Advisory Process for this stock occurred in 2013 (DFO 2013, Hubley et al. 2013) and updates were conducted for years 2014-2016 (DFO 2014, 2015, 2016).

The management of the main Scallop fishery on Browns Bank refers to the northern part of the Bank. Browns Bank South is a marginal growth area for scallops and has separate management measures (Appendix 1). The assessment and advice presented in this document uses the assessment framework established in 2011 (Hubley et al. 2011) for Browns Bank North.

This Science Response reports results from the Science Response Process of April 3, 2017, on the Stock Status Update of Offshore Scallop: Browns Bank North and Georges Bank.

Analysis and Response

The 2016 TAC was 500 tonnes (t) for Browns Bank North and total reported landings were 508 t (Figure 1). Based upon preliminary analysis of the 2016 fishery data and the annual stock survey data, an interim TAC of 750 t was set in December 2016 for the 2017 Browns Bank North fishery.

Science advice is provided for this stock using a Bayesian state-space modified delay difference assessment model that integrates both fishery and survey data and is described in Hubley et al. (2013). The model fit to the survey estimates of fully-recruited (> 95 mm shell height) biomass, recruit (85-94.9 mm) biomass, and fishery catch per unit effort (CPUE, kg/(hour-meter)) are shown in Figure 2. Estimates of fully-recruited biomass in 2016 and projections of fully-recruited biomass for 2017 under various catch scenarios are presented for this stock (Figure 3 and Table 1).

The median fully-recruited biomass, estimated to be 4,708 t in 2016, is similar to the 2015 estimate (4,684 t), and remains below the long-term median biomass of 5,709 t (Figure 3; the long-term median calculations (1991-2015) exclude the current year (2016) estimates). The median recruit biomass, estimated to be 785 t in 2016, is similar to the 2015 estimate (782 t), and above the long-term median recruit biomass of 584 t.

The model's forecasted fully-recruited biomass for 2017 is 4,295 t; this forecast assumes:

a) a catch of 750 t (the interim TAC),

b) that condition in 2017 remains the unchanged from 2016 (12.4 g/dm^3), and

Canada

c) that natural mortality in 2017 will be unchanged from 2016 (0.19).

This represents an estimated 9% decrease in fully-recruited biomass from 2016 to 2017 (Table 1). Reference points have been proposed for the fishery (DFO 2012) but have not yet been adopted.

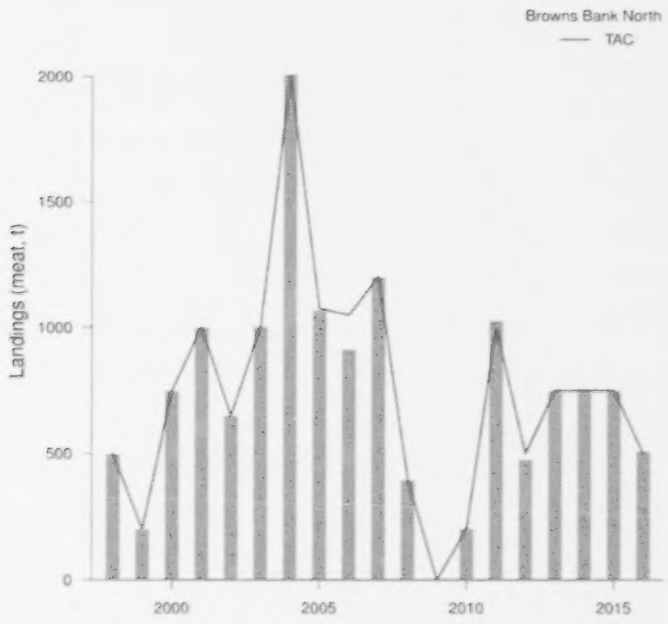

Figure 1. Landings of Scallop meats (metric tons) from Browns Bank North between 1998 and 2016. The blue line represents total allowable catch (TAC), in metric tons. Prior to 1998, landings from Browns Bank North were combined with Browns Bank South.

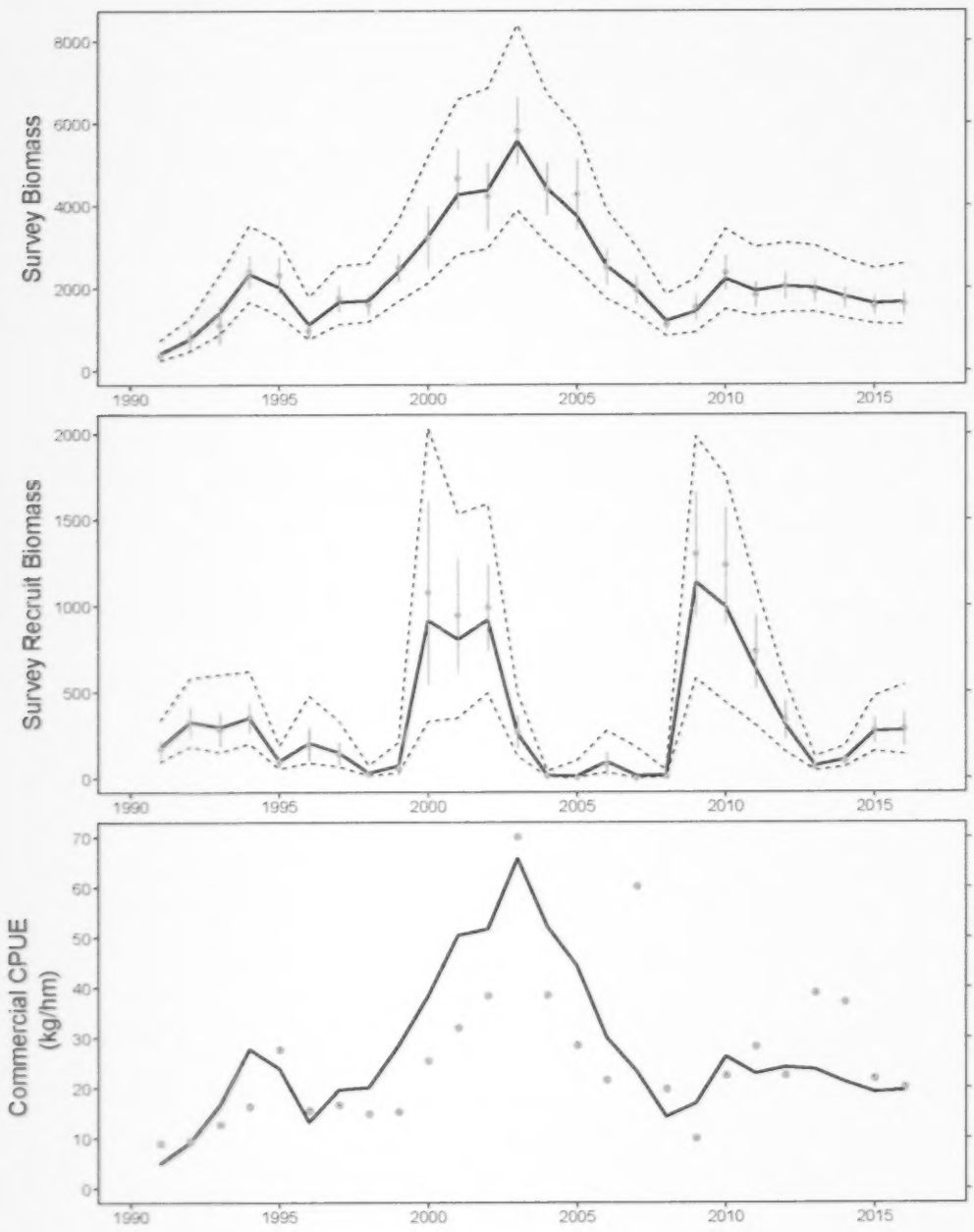

Figure 2. Summary of model results and inputs for fully-recruited survey biomass (top panel, in tonnes), recruit survey biomass (middle panel, in tonnes) and CPUE (bottom panel, in kg/hm) for Browns Bank North. The thick black line is the model estimate with 95% credible interval (dotted line). Circles represent observed values from the survey and the fishery. For the survey data, the vertical lines represent the standard error associated with the observed values.

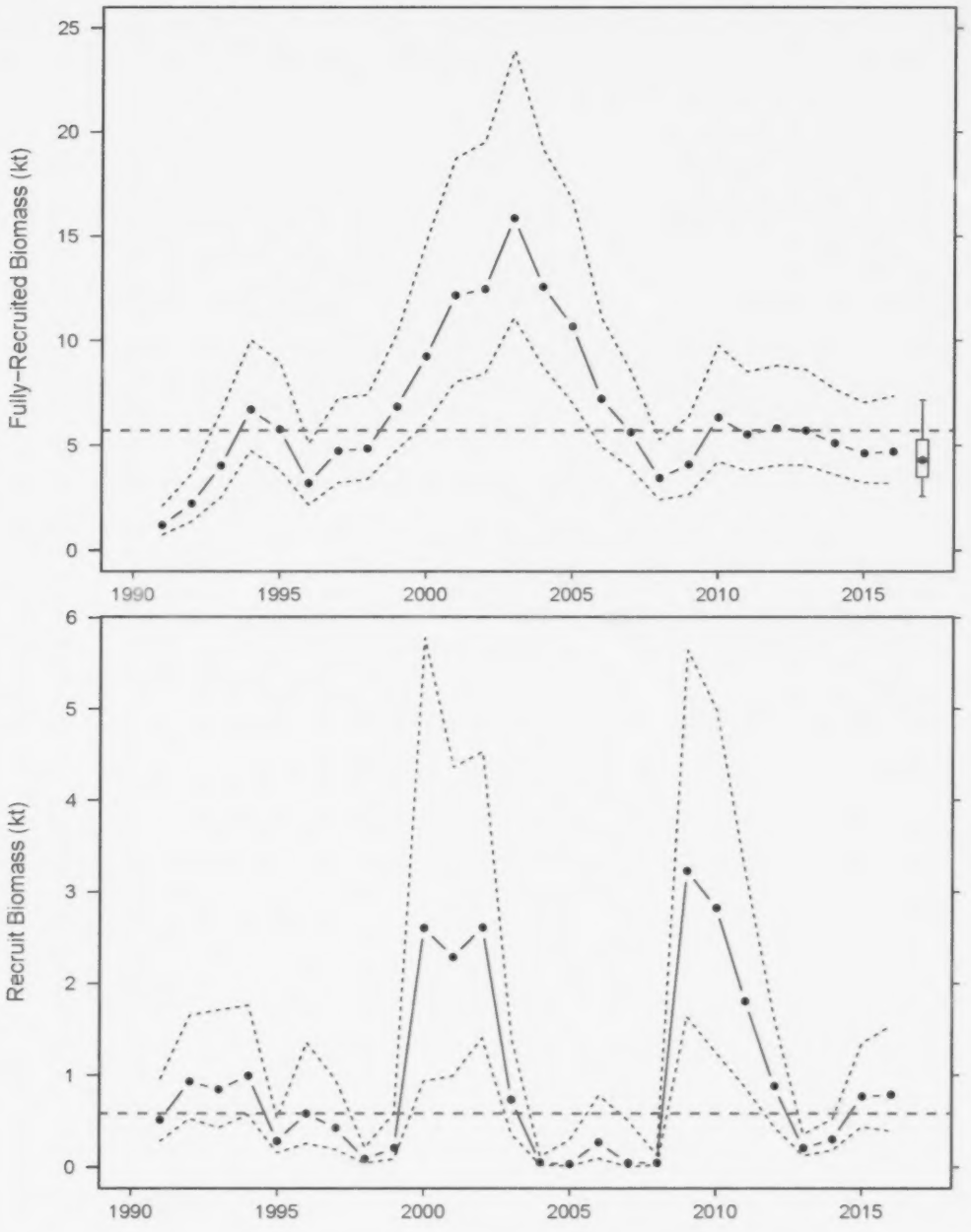

Figure 3. Biomass estimates for fully-recruited (top panel) and recruit (lower panel) scallops from the stock assessment model fit to the Browns Bank North survey and commercial data. Dashed lines are the upper and lower 95% credible limits on the estimates. The blue horizontal dashed line represents the long-term median biomass. The forecasted fully-recruited biomass for 2017, assuming a catch of 750 t, is displayed as a box plot with median (•), 50% credible limits (box) and 80% credible limits (whiskers).

Table 1. Catch scenarios for Browns Bank North in 2017 in terms of exploitation and expected changes in fully-recruited biomass. Potential catches in 2017 are evaluated in terms of the probability of a decline in biomass. These probabilities account for uncertainty in the biomass forecasts.

Catch (t)	Exploitation Rate	Probability of Biomass Decline	Expected Change in Biomass (%)
200	0.11	0.47	2
300	0.13	0.50	0
400	0.15	0.53	-2
500	0.17	0.56	-4
600	0.19	0.58	-6
700	0.20	0.61	-8
750	0.21	0.63	-9
800	0.22	0.64	-10
900	0.24	0.67	-12
950	0.25	0.68	-13

Conclusions

The 2017 interim TAC of 750 t results in an exploitation rate of 0.21 and an expected 9% decrease in biomass (Table 1). Catch scenarios ranging from 200 t to 950 t were examined; scenarios with a catch greater than 300 t result in projected declines in fully-recruited biomass. The probability of biomass decline ranged from 0.47 (200 t) to 0.68 (950 t) while the change in biomass varied from 2% to -13% for the catch scenarios presented (Table 1).

Contributors

Name	Affiliation
David Keith (Co-Lead)	DFO Science, Maritimes Region
Jeremy Broome (Co-Lead)	DFO Science, Maritimes Region
Alan Reeves	DFO Science, Maritimes Region
Tricia Pearo Drew	DFO Science, Maritimes Region
Daphne Themelis	DFO Science, Maritimes Region
Heath Stone	DFO Science, Maritimes Region
Lottie Bennett	DFO Science, Maritimes Region
Verna Docherty	DFO Resource Management, Maritimes Region

Approved by

Alain Vézina
Regional Director of Science
DFO Maritimes Region
Dartmouth, Nova Scotia
Ph. 902-426-3490
Date: June 13, 2017

Sources of Information

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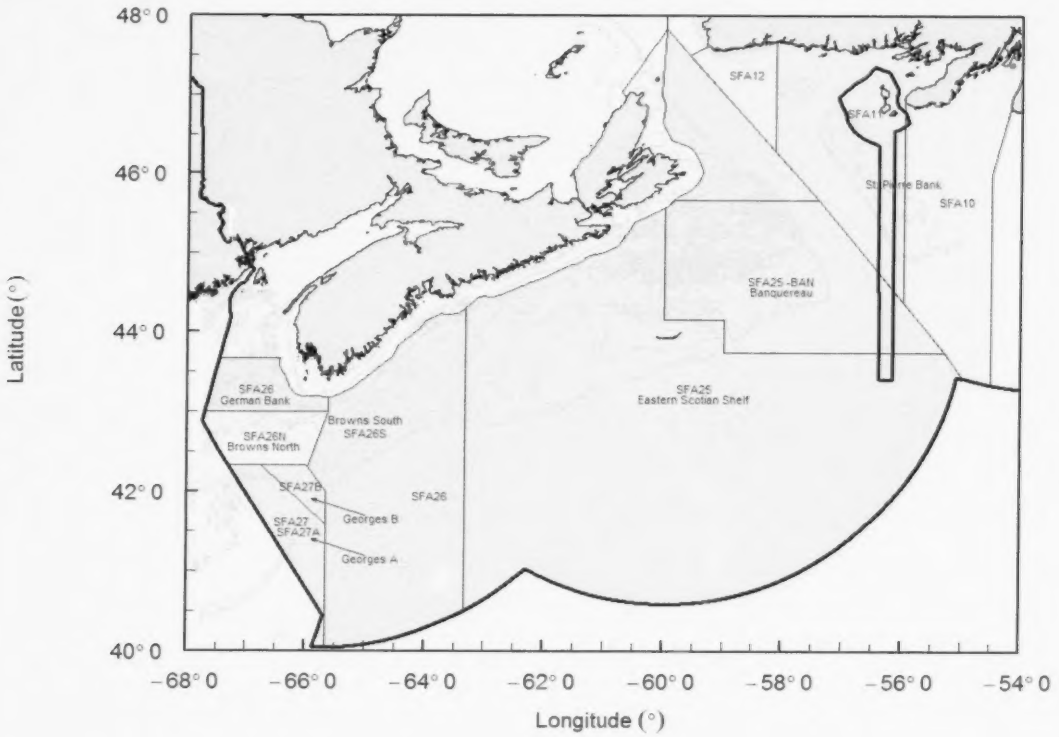
Appendix

Appendix 1. Map showing the offshore scallop fishing areas (SFAs) 25-27 used for management purposes in the Maritimes Region. Note the division of Browns Bank North as a subarea of SFA 26.



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Center for Science Advice (CSA)
Maritimes Region
Fisheries and Oceans Canada
Bedford Institute of Oceanography
1 Challenger Drive, PO Box 1006
Dartmouth, Nova Scotia B2Y 4A2

Telephone: 902-426-7070
E-Mail: XMARMRAP@dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas-sccs/

ISSN 1919-3769
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Correct Citation for this Publication:

DFO. 2017. Stock Status Update of Browns Bank North Scallops (*Placopecten magellanicus*). DFO Can. Sci. Advis. Sec. Sci. Resp. 2017/032.

Aussi disponible en français :

MPO. 2017. Mise à jour de l'état du pétoncle du nord du banc de Brown (Placopecten magellanicus). Secr. can. de consult. sci. du MPO, Rép. des Sci. 2017/032.